Essays on the Effective Market Dynamics

Jan Novotný

Abstract In the first chapter, I employ high frequency data to study extreme price changes (i.e., price jumps) in the Prague, Warsaw, Budapest, and Frankfurt stock market indexes from June 2003 to December 2010. I use the price jump index and normalized returns to analyze the distribution of extreme returns. The comparison of jump distributions across different frequencies, periods, up and down moves, and markets suggests a possible relationship with market micro-structure. I also show that the recent financial crisis resulted in an overall increase in volatility; however, this was not translated into an increase in the absolute number of jumps. In the second paper, I empirically analyze the price jump behavior of heavily traded US stocks during the recent financial crisis. Namely, I test the hypothesis that the collapse of Lehman Brothers caused no change in the price jump behavior. To accomplish this, I employ data on realized trades for 16 stocks and one ETF from the NYSE database. These data are at a 1-minute frequency and span the period from January 2008 to the end of July 2009. I employ five model-independent and three model-dependent price jump indicators to robustly assess the price jump behavior. The results confirm an increase in overall volatility during the recent financial crisis---after the collapse of Lehman Brothers; however, the results cannot reject the hypothesis that there was no change in price jump behavior in the data during the financial crisis. This implies that the uncertainty during the crisis was scaled up but the structure of the uncertainty seems to be the same. Finally, in the third chapter, I perform an extensive simulation study to compare the relative performance of many price-jump indicators with respect to false positive and false negative probabilities. I simulated twenty different time series specifications with different intraday noise volatility patterns and price-jump specifications. The double McNemar (1947) non-parametric test has been applied on constructed artificial time series to compare fourteen different price-jump indicators that are widely used in the literature. The results suggest large differences in terms of performance among the indicators, but I was able to identify the best-performing indicators. In the case of false positive probability, the best-performing price-jump indicator is the one based on thresholding with respect to centiles. In the case of false negative probability, the best indicator is based on bipower variation.